**Appendix 1: Summary of the literature review search terms and process.**

Literature search was undertaken by the researchers with the assistance of the University librarian to assess data relating to the role and use of phone / mobile device videos to assist in the delineation of children with seizures and paroxysmal events. Pubmed, Scopus, EBSCOHOST, Web of Science and Google Scholar were searched. Search terms were “Neurology”; “home video OR home videos OR mobile video OR mobile videos OR smartphone videos OR smartphone videography”; “Diagnosis OR diagnose OR delineation”. With MeSH search headings included where available. Only human clinical studies published in English were included, case reports of under 5 patients were excluded. Review articles were screened for additional papers.

**Table 1:** Summary of the literature on use of home videos to differentiate seizures from other paroxysmal events. Delineated via PICO analysis (Population, Intervention, Comparator, Outcome)

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| --- | --- | --- | --- | --- | --- | --- |
| **Paper /**  **Location / year** | **Study Question**  **Study Type** | **Population group** | **Intervention** | **Comparator** | **Outcome:** | **Comment** |
| Amin *et al18*  USA  2021 | Assessed the efficacy of smartphone videos.  Adult study  Prospective, over 2 years, single centre | *N*=54 patient smartphone videos (later confirmed on vEEG).  2 blinded epilepsy experts. | Reviewed smartphone videos to differentiate into epileptic and non-epileptic categories | Confidence based in smartphone video compared to needing to progress to vEEG results. | 18/54 patients - video or vEEG inconclusive.  36/54 confident in diagnosis and included in the analysis. 94% agreement in this group. | Supported smartphone videos as diagnostic adjunct for seizure-like events. |
| Karakas *et al21*  USA  2021 | Assessed confidence to differentiate PNES, ES and physiologic non-epileptic movement disorders from smartphone videos  Prospective single centre study. | Adults. Veterans *n*=50. Already had vEEG with definitive diagnoses.  Epileptologists *n*=4 | Known patients asked to supply the smartphone videos.  Blinded Epileptologists shown smartphone videos.  Assessed for accuracy. | Comparison between videos alone and videos with basic demographics | Diagnosis for video alone 83.9% with sensitivity 83.9% and specificity 89.6%.  Adding basic patient demographics did not significantly improve accuracy. | Supported smartphone videos as a diagnostic tool. Noted use of secure online platforms. |
| Tatum *et al* 19  USA  2021 | Reviewed videos from 2020 OSmartViE study for video quality  Prospective multicentre study | 7 epileptologists and 6 neurology residents reviewed 530 smartphone videos from 44 adult patients | Assessed the quality of the videos how this impacted on the accuracy of the assessment | - | Accurate diagnosis 11/44 (all reviewers). Poor video quality led to unknown diagnosis 24.2%. Compounding factors – inadequate interactivity, restricted field of view and short video duration. Noted that motor signs useful for differentiation of events | Provided useful guidelines to optimize video quality. Videos loaded to a secure platform. |
| Tatum *et al20*  USA  2020 | Assessed usefulness of OPD smartphone videos to diagnose ES from first time outpatients presenting with good quality videos and subsequently delineated with vEEG.  Prospective, masked, diagnostic accuracy study (the OSmartViE study). | Epileptologists (*n*=10) and trainee neurology doctors (*n*=9) from 8 academic epilepsy centers viewed *n*=530 smartphone events from 44 adult patients (530 total physician reviews) | Epileptologists and trainees decided diagnosis (ES or PNES).  Measures of performance (accuracy, sensitivity, specificity, PPV, and NPV) for smartphone video diagnosis by experts and trainees were compared with those for history and physical examination and video EEG monitoring | Validity of the tool (smartphone video) based on level of experience. | About 80% of recorded videos were ranked by reviewers as adequately good quality.  Smartphone video was accurate in predicting diagnosis of epileptic seizures by experts in 89.1%, specificity 93.3%. Resident responses less accurate, despite greater confidence. Motor signs during events increased accuracy.  Addition of history and examination to video, diagnoses rose from 78.6% to 95.2%. A correct diagnosis was 5.45 times greater when smartphone video accompanied history and examination. | Expert review of outpatient smartphone video has predictive and additive value to diagnose ES. Smartphone videos may reliably aid PNES.  Encouraged interactivity, longer recordings and optimal views.  Promoted as triage for vEEG. |
| Huang *et al14*  China  2019 | 1. role of home videos for diagnosis on the patients’ first  visit,  2. the cost savings of video online consultation,  3. what type of doctor is optimal.  Prospective study | 452 practitioners from six centers attending pediatric academic conferences. | Practitioners asked for diagnoses from descriptions alone of 12 infants with paroxysmal events | Same group was re-questioned after watching the corresponding home videos of the episodes | 301/ 452 met the criteria (66.6%) for analysis. The mean correct diagnoses with and without videos was 8.4 / 12 and 7.5 /, respectively. For ES, mobile phone videos increased the mean accurate diagnoses by 3.9% (*p*= 0.006); for nonepileptic events, it was 11.5% (*p*<0.001). More senior paediatric neurologists had higher diagnostic accuracy. | Home videos are a cost-effective tool and useful for the diagnosis of infantile paroxysmal events. |
| Ramanujam B, et al.17  India  2018 | Role of mobile phone videos to diagnose PNES.  Hospital based study  Prospective study | *n*=783 videos patients suspected with PNES  aged 10-50 years of age | 269 / 783 videos selected.  155 had fair quality (QOV 5-7) and 114 had good quality (QOV 8-10)  Videos reviewed by epilepsy fellow (blinded to clinical history; step 1) labelled PNES >3 semiological features reported by \*LaFrance et al. / \*\*Lazarus et al. 49, 50  All patients subsequently had vEEG reviewed by epileptologist (blinded to diagnosis); step 2 concordance between their diagnoses | Compared to video EEG telemetry recordings | The diagnosis at step 1 was ES in 71.4% and PNES in 27.1%. Diagnosis at step 2 was PNES in 25.3%, other physiologic events in less than 1% and ES in 73.6%.  Concordance between the diagnoses in steps 1 and 2 of 97.2%.  PNES diagnosis sensitivity of 95.4%, specificity of 97.5%, positive and negative predictive values of 92.65% and 98.5% respectively.  Key semiological features on home videos for PNES were:  Eye closure; accuracy 96.2%  Crying /shouting; accuracy 89.6%  Hyperventilating; accuracy 89.1%  Wild, uncoordinated movements; accuracy 71.74%  Lying still/no movements; accuracy 81.6% | Good quality home-videos may differentiate PNES from ES and can complement vEEG in diagnosing PNES in a cost-effective way.  Utilised QOV scale13. Noted significant proportion of videos could not be used. |
| Wasserman and Herskovitz25  Israel  2017 | Compared capacity of clinicians of different levels of experience to diagnose PNES from ES  Prospective study | 46 participants, 26 non-neurological and 20 neurological personnel. | Ability of neurologists to differentiate between PNES and ES in 10 adolescents and adult videos (5 PNES and 5 ES) to reduce diagnostic delay and need for vEEG. | Ability of non-neurologists to differentiate between PNES and ES | Epileptologists diagnosed correctly 87.5%, general neurologists 72.8%, neurology nurses 69.8%, ER nurses 58%, Internal medicine physicians 54.1% and ER physicians 44.4%. Statistical significance between general physicians to all neurology professions. | Neurologists most able to recognize seizures from semiology alone. Promoted video of episodes and education. |
| Ojeda *et a*l12  Spain  2016 | Explored the role of home video to assist epilepsy diagnosis in adults  Prospective observational study | 317 adults with drug resistant epileps, caregivers instructed to record optimal home video.  Video instructions inclued lights on, record with steady hand, asses patient’s awareness and memory, capturing face and whole body. | 3 neurologists/ epileptologists rated the quality of recordings following parameters (face or whole body recorded, environmental illumination, single or multiple events, early stage of event recorded) and made a clinical diagnosis. | In a second phase, previous diagnosis was revised. | 50 / 87% (n=135) of those with recording devices were unable to record events. Due to low seizure frequency: 60%, seizures short duration: 80%. 50 events from 22 patients recorded. Previous epileptic syndrome diagnosed (based on description/neuroimaging/EEG): 15 TLE, 4 frontal epilepsy, 3 epileptic encephalopathy.  QOV mean rating 4.6 / 8 points (5 had excellent recordings, (QOV 8-10), 64% had medium quality recordings ( QOV 5-6) and 27% had low quality recordings (QOV 3-4)  Neurologists agreed on clinical / semiological diagnoses in all but one patient.  18 patients’ diagnoses were confirmed, 3 were found to be misdiagnosed with TLE and had PNES.  It was also highlighted that non-epileptic seizures were more likely to be recorded and yielded better QOV scores than ES, though no statistical conclusions could be drawn due to low numbers. | Some bias as patients already in epilepsy service and caregivers told how to perform video. Used different recording methods Photo camera: 100%, cell-phone: 100%, webcam: 10%, video camera: 30%). Only half of these able to capture event. Recommended homemade videos may be of diagnostic value in epilepsy management. Training needed to perform good-quality videos. Webcam long term recordings recommended option.  Used a QOV rating score- as devised by Dash et al 201613. |
| Dash *et al13*  India  2016 | Evaluated yield of different semiological signs inferred from caregiver descriptions and role of home videos as independent tools to diagnose epilepsy in a resource poor setting, with assumption of limited repertoire of terminologies due to low education.  Prospective observational study. | Home videos from 312 patients with a total of 624 seizures analyzed.  572 seizures from 282 patients had vEEG to verify diagnosis.  Phase I: participants recorded events assessed by QOV scale developer. 29 point questionnaire completed by assessors on video recording and made a diagnosis  Phase II: The 29 point questionnaire administered to caregivers by epilepsy resident and attempted diagnosis from caregivers descriptions  Phase III: vEEG / semiology analysed by epileptologist using the 29 point semiology questionnaire and a diagnosis made. | Questionnaire of 29 different semiological features administered on findings of home video  The QOV scale for assessing video quality was developed for this study by one of the co-authors Manjari Tripathi (an epileptologist) and utilized in other studies subsequently | Agreement on semiological signs measured between the questionnaire completed on the basis of medical history and home videos and on the basis of vEEg (gold standard) | The mean number of signs of semiology recorded after analysis of the home videos was 3.3 ± 2.2, and from the caregiver medical history was 2.1 ± 1.1 (*P* < 0.01). Bilateral generalized clonic movements of limbs, motor movement around mouth, fear, visual phenomenon, hemisensory phenomenon, and post-ictal unilateral weakness had the highest accuracy (greater than 85% sensitivity, specificity and accuracy). The overall agreement of semiological signs inferred from medical history versus vEEG was 0.75 and between home video recordings versus vEEG was 0.92. | More patients were correctly categorized into the focal epilepsy group when home videos were used compared to when medical history alone. Concluded that home videos were more reliable for semiological signs and classifying epilepsy type than history provided by caregivers of PWE. |
| Erba *et al*23  Italy / USA  2016 | Reviewed confidence of 5 adult and child neurology specialists to categorise video events captured in vEEG unit  Prospective study. | Specialists 4 blinded and 1 unblinded.  23 video events from 21 patients  Patients > 18 years of age | Specialists asked to categorise videos under 5 headings 1. ES 2. PNES 3. NES 4. Can’t say 5. Other | No control group but study did explore inter-observer consistency | 30.4% accuracy for categories  21.7% failed to accurately categorise. | In a 1/3 videos were useful diagnostic aids. The video quality was likely to be high as videos part of vEEG. |
| Goodwin *et al15*  United Kingdom  2014 | Assessed if patients on ambulatory EEG could match events with home video recording.  Carers recorded events alongside the ambulatory EEG  Prospective study | Total of 130 patients offered a camcorder but only 45 patients (35%) accepted. Adults and children age range 13 days to 59 years.  N=45 | Caregivers who agreed to record events of they occurred during the study | No control group | 34 (76%) had an event of which 17 (50%) were adequately/satisfactorily recorded. The main reasons for failure were that attacks were too brief, or machine error. Attacks were captured with greater success in children (14/23, 61%) than adults (3/11, 27%). Of the 17 video recordings, 14 (82%) aided interpretation of the ambulatory EEG. | Only 35% agreed to participate. Refusal mainly as events too brief . |
| Beniczky *et al* 24  Denmark  2012 | Consensus of clinical description versus neurophysiology unit captured videos of events. y  Prospective study. | 41 events from 30 patients. 2-63years (median 23 years)  Full clinical and investigations (vEEG) collated to consolidate final diagnosis | 5 epileptologists showed either video or clinical descriptions randomly allocated so that they could not match the patients. | Compared consensus for conclusions of clinical description compared to video of events | 88% confidently assessed videos alone with 86% accuracy.  66% reached consensus for clinical description alone  with 54% accuracy. | Video recordings significantly increased the diagnostic yield. Videos recorded in a laboratory and were high quality. |
| Chen *et al* 22  USA  2008 | Compared video EEG recordings of patients with PNES and ES recorded in hospital screens for accuracy of differentiating from the video alone.  Prospective observational study | 43 patients with 43 events (27 ES and 16 PNES)  Adults (17-65 years) | Either EEG or videos were shown to blinded specialists with no clinical history. | Independent EEG compared to video | Video recordings alone permitted specialists to correctly identify those with ES with a sensitivity 93% and specificity of 94%. | Supported home video as a screening tool for a subset of patients with neuro-behavioural events.  Of note videos high quality a captured in a control environment. |
| Samuel and Duncan16  United Kingdom  1994 | The role of hand held video camcorder in the evaluation of seizures  Prospective study | 22 consecutively filmed patients with undiagnosed events had events recorded via hand –held video camcorder on the ward by the nursing staff. Video tapes were reviewed by medical staff | Camcorder events reviewed for ability to differentiate ES from and non-epileptic events.  Global picture of event close to onset. Then focused on eyes, mouth, cyanosis, breathing patterns, speech and sounds. Camera could record in low light. Staff member interacted with patient  Serum prolactin levels measured. interictal EEG and continuous EEG where feasible. Final diagnosis based on the combined evidence | No comparator | Videotapes assisted the diagnosis of PNES in 9/22 (41%), and ES in 8/ 22 (36%). 8 failed to generate useful video information. In 2 (9%) a confident diagnosis of PNES could be made from the videotapes alone. 7 patients subsequently required video-EEG telemetry.  In the 10 patients with PNES, ket features were - Resistance to attempted eye opening or avoiding eye contact in 8, elaborate and prolonged rigidity, opisthotonos, arm waving or leg kicking in 7, facial grimacing to menace or to testing plantar reflexes in 4 voluntary salivation in 2 patients directly interacting with camera on realising that they are being filmed (2) and self- restraint with the arms during falling in one patient. | Interactions with patients during filming were particularly helpful.  It was concluded that the hand -held video camera is a useful and inexpensive tool to provide accurate seizure descriptions, but it should be used in conjunction with other evidence to classify seizures |